Visitor Use Management Protocol

Automated Trail Counter Protocol to Monitor Trail Use

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Overview

Automatic trail counters are a commonly used tool for monitoring trail use in parks. These small, relatively inexpensive devices collect data continuously, which allows staff to assess patterns of use over time. This protocol focuses on placing and calibrating a trail counter. The specifics of configuring a counter, downloading data, and troubleshooting will depend on the brand of trail counter.

Considerations

Figure 1. A trail counter placed on a post next to a popular frontcountry hiking trail in Big Basin Redwoods State Park. Photo: Madeline Aberg.

1) Trail counters count the number of times a beam is crossed. They may count the same person multiple times or non-human objects (vegetation, wildlife, vehicles, etc.). Thus, the data from a trail counter should be interpreted carefully.
2) Trail counters require relatively low staff time. However, they need to be calibrated between 5 to 10 hours to account for any over- or under-counting. A counter also needs to be recalibrated if the system changes (e.g., a new trail opens).
3) Counters should be checked regularly to collect data, check battery levels, and check for vandalism.
4) Many trail counters include software that can be used to upload and summarize data. These summaries are useful for checking for issues and for tracking relative trends. However, counts should be corrected with a calibration coefficient prior to final reporting.
5) Trail counters work best on relatively narrow trails or roads, where people are generally walking one-by-one. Wide trails can lead to undercounting visitors.

Best Practices for Trail Counter Placement

- The counter should be placed a short distance up the trail from the trailhead area to avoid catching visitors who are lingering or reading trailhead signs.
- Do not place the counter directly across from an interpretive sign or kiosk.
- The counter should be placed before any junction in the trail to ensure you count all visitors entering the trail system.
- The counter should be placed 2 to 6 meters from where visitors will be passing and positioned where it will hit most visitors at approximately torso height.
- Avoid placing the counter in line with vegetation that may move significantly in the wind.
- Avoid placing the counter is a location where it will receive direct sunlight, as this can set off the counter.
- Document the date and time the counter was installed.
- Check the counter and examine the data for issues within a week of placing the counter.
    - If counts are very high throughout the day, vegetation may be setting off the counter.
    - If counts are high around sunrise or sunset each day, direct sunlight may be setting off the counter.

Figure 2. An undergraduate researcher checks a trail counter at Big Basin Redwoods State Park.Photo: Conner Wanless.

Tips

- Include a desiccant pack inside the trail counter to mitigate potential moisture build up.
- If using a trail counter on a frontcountry trail, consider any regular interpretive walks or group hikes on the trail. If these occur and include regular stops along the trail, avoid placing a counter at one of the stops.
- Trail counters are sometimes vandalized because visitors think they are being photographed.
- Track the date and time that counters are checked and note any irregularities.
- Not all trail counters display a count. If using a counter that does not display counts, remove the “Trail Counter Count at Start” and “Trail Counter Count at End” from the Trail Counter Calibration Log Sheet. In these cases, you can still compare observer counts to the hourly trail counter summary.

Trail Counter Calibration Protocol

Note: Calibrations must occur in 15-minute intervals for a total of 1 hour, starting and ending on the hour. For example, a proper calibration count would start at 10:00am and stop at 11:00am. The datasheet would show counts from 10:00 – 10:15, 10:15 – 10:30, 10:30 – 10:45, and 10:45 – 11:00. This is done to match the 1-hour interval at which the counter collects data.

By the end of data collection, each trail counter should be calibrated for at least 5 hours and no more than 10 hours.

1) Position yourself so that you can clearly see the trail, are out of the way of traffic on the trail, and will not be counted by the counter. You can sit behind the trail counter, if that is appropriate, but be careful not to damage sensitive resources.
2) Fill out the first columns of the data sheet:
    - **Date**: The date of the calibration count, MM/DD/YYYY
    - **Tech. Initials**: Initials of the technician(s) completing the calibration count.
    - **Sky Cover**: Write in the category that best describes the predominant weather conditions during the count.
        - "Sunny," "Partly cloudy," or "Overcast."
    - **Precipitation**: Write in "present" or "absent" depending on the predominant conditions during the data collection.
    - **Temperature**: Estimate the temperature within 10 ºF for the data collection period.
    - **Counter Location**: Use a consistent name to specify the counter location.
3) Calibrations will occur in 15-minute intervals in a 1-hour session per sampling period. **Counts must start and end on the hour**.
    - At the start of the first 15-minute interval, record the exact **Start Time** (HH:MM) when you start counting, along with the number on the trail counter screen (**Trail Counter Count at Start**).
    - Record the number of visitors as they pass the trail counter. **Record all humans that pass, even if they are children or babies in carriers or strollers**. Record the total in each direction:
        - **Visitor Count Up**: The number of people traveling away from the trailhead or parking lot (or entering the trail).
        - **Visitor Count Down**: The number of people traveling toward the trailhead (or exiting the trail).
4) At the end of each 15-minute interval, record the following on the calibration log sheet:
    - **Time**: The exact time (HH:MM) when you are finished counting
    - **Total Visitor Count**: Add up the "Visitor Count Up" and "Visitor Count Down" numbers to record your total count for the 15-minute interval.
    - **Trail Counter Total at End**: The number on the trail counter screen.
5) Begin the next 15-minute interval and repeat these steps until you have recorded a total of 1 hours' worth of data (Four 15-minute intervals). Be sure to end at the hour mark.

Data Analysis

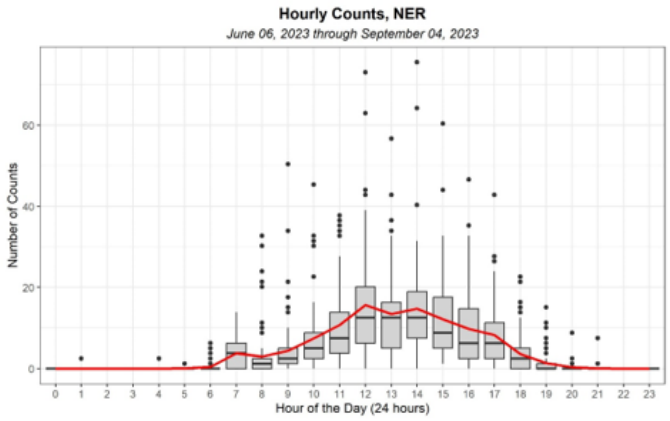
Clean the Data

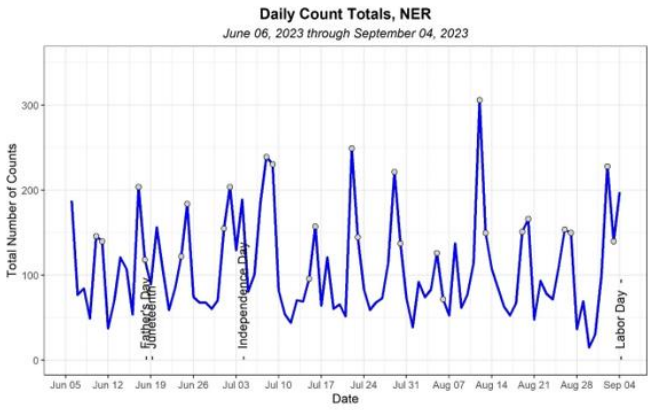
- Remove all observations outside of the sample period.
- The first and last days a camera was in use may be outliers. It is generally recommended to remove these dates.
- Check the data for outliers and dates with missing data (< 24 hour-summaries).

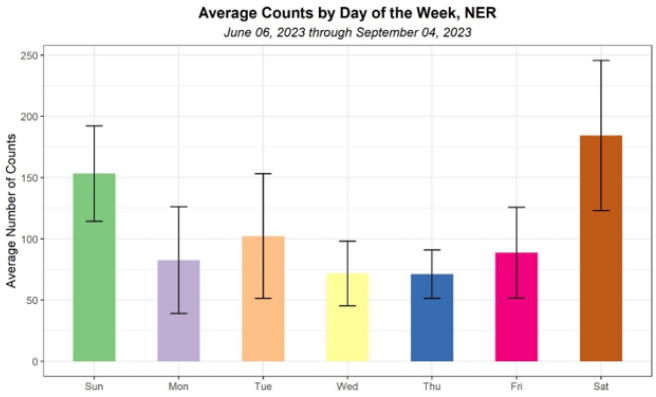
Calibration

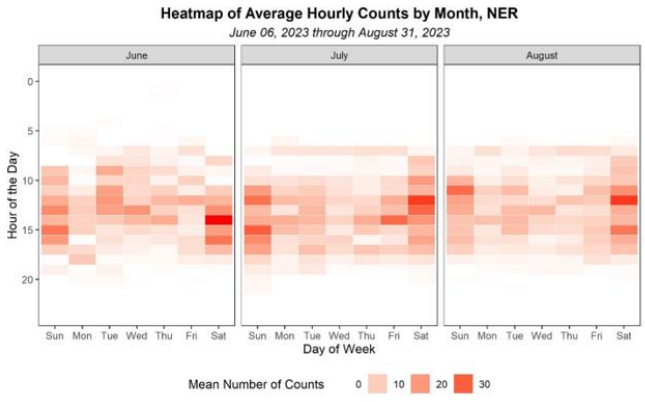
- Use the calibration data.
- Fit a linear regression model where the response variable (y) is the number of counts by an observer and the predictor (x) is the number of counts by the trail counter.
- Use the model of the relationship between counts and observed people to correct the number of counts for the full sample period. (i.e., put the raw counter data into the model as x, then the responses will be your corrected counts).
- Use the corrected counts in summaries.

Possible Summaries









Examples from Aberg et al. (2023). 2023 Big Basin Redwoods State Park Observational Monitoring.

Trail Counter Calibration Log Sheet

Date	Tech. Initals	Sky Cover	Precipitation	Temperature	Counter Location	Start Time	End Time	Trail Counter Count at Start	Visitor Count UP	Visitor Count Down	Total Visitor Count	Trail Counter Total at End

RESOURCES

TRAFx Trail Counter Manual

A popular choice for trail counters.

https://www.trafx.net/downloads/TRAFx_Manual_Part_I.pdf?v=220121

https://www.trafx.net/downloads/TRAFx_Infrared_Trail_Counter_Instructions.pdf?v=210922

Big Basin Redwoods State Park Example

Aberg, M., T. E. Hall, and A. D'Antonio. 2023. 2023 Big Basin Redwoods State Park Observational Monitoring. Report prepared for California State Parks and Parks California. Corvallis, OR: Oregon State University, Department of Forest Ecosystems & Society.

SUGGESTED PROTOCOL CITATION

D'Antonio, A., Hall, T. E., & Aberg, M. (2023). Automated Trail Counter Protocol to Monitor Trail Use. Protocol prepared for the Visitor Use Management Toolkit. Corvallis, OR: Oregon State University, Department of Forest Ecosystems & Society.